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#### INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C01B31/02 D01F11/12

#### **B. FIELDS SEARCHED**

 $\begin{array}{ll} \mbox{Minimum documentation searched (classification system followed by classification symbols) } \\ \mbox{IPC 7} & \mbox{C01B} & \mbox{D01F} \\ \end{array}$ 

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/110513 A1 (SMALLEY RICHARD E ET AL) 15 August 2002 (2002-08-15) the whole document	1-48
X	WO 02/060812 A (UNIV RICE WILLIAM M ; YANG JIPING (US); BAHR JEFFREY L (US); TOUR JAME) 8 August 2002 (2002-08-08) page 18, line 27 - page 21, line 5 examples 19-25	46,47
A	claim 1 	1-45,48

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Date of the actual completion of the International search  19 March 2004	Date of mailing of the international search report 25/03/2004
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	EDERLE Y ET AL: "CARBANIONS ON GRAFTED C60 AS INITIATORS FOR ANIONIC POLYMERIZATION" MACROMOLECULES, AMERICAN CHEMICAL SOCIETY. EASTON, US, vol. 30, no. 15, 28 July 1997 (1997-07-28), pages 4262-4267, XP000657706 ISSN: 0024-9297 the whole document		1-48		

## INTERNATIONAL SEARCH REPORT

tion on patent ramily members

03/36844 Patent family Patent document Publication Publication cited in search report date member(s) date US 2002110513 **A1** 15-08-2002 ΑU 6044599 A 10-04-2000 CA 2344577 A1 30-03-2000 EP 1112224 A1 04-07-2001 JΡ 2002526360 T 20-08-2002 US 2001041160 A1 15-11-2001 CN 1383418 T 04-12-2002 30-03-2000 WO 0017101 A1 US 2001031900 A1 18-10-2001 04-07-2002 US 2002086124 A1 US 2002004028 A1 10-01-2002 08-08-2002 WO 02060812 Α GB 2389847 A 24-12-2003 WO 02060812 A2 08-08-2002

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